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ABSTRACT

Developed by the Advanced Systems Development Division of International Business Machines (IBM) in consultation with two professors, the Educational and Career Exploration System (ECES) includes information on 400 occupations and 300 post-high school majors. Designed for the high school student and for use with a computer terminal, the system includes charts which summarize and compare information about the student and his explorations. To evaluate the program, data were gathered on an experimental group and a control group of 10th graders, and also from counselors and parents of the students. Analysis of the data revealed that: (1) While students tended to concentrate on occupations during their first sitting at the ECES terminal, they used their second sitting to explore both occupational and educational opportunities, (2) Parents of users were generally pleased with the effects of the system and stated that they were more involved in the educational and vocational planning of their children than they had been previously, and (3) Counselors had positive reactions to the system and were optimistic about its effect on students. Despite these positive results, however, the anticipated gains in vocational maturity were not realized during this first year of the field test. (Author/JS)

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THE EDUCATIONAL AND CAREER EXPLORATION SYSTEM: FIRST YEAR REPORT OF A COUNTY-WIDE FIELD TRIAL AND EVALUATION

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INTRODUCTION

Developed several years ago at the Advanced Systems Development Division of International Business Machines (IBM), in consultation with Professors Donald E. Super and Roger A. Myers of Teachers College, Columbia University, the Educational and Career Exploration System (ECES) had its first field trial and evaluation at Montclair High School in New Jersey in the Spring of 1969. The results of that field trial were reported in detail in an unpublished monograph (Thompson et al., 1970), and summarized in a paper by Bohn et al., read at AERA in 1970, and in several other places in the professional literature. After initial trial ECES was revised and expanded by IBM in preparation for a county-wide field trial in Genesee County (Flint), Michigan. This report presents some of the results of the first phase of that project.

In its present configuration ECES contains three sections: Occupations (400 occupations, representing many fields and levels), majors (300 post-high school, college, and other training programs), and charts, which summarize and compare information about the student and his explorations. These three sections are available to the student in an interactive mode. The terminal which the student uses consists of a film image display unit which presents relatively static information and questions and a typewriter which presents relatively individualized information to the student. In addition a fourth section of ECES, a post-high school program locator called College Finder, is available without the use of a terminal.

BACKGROUND AND METHOD

The field test and evaluation of ECES in Genesee County was conceived as a five-year project. The primary purpose during the first year was to develop a sound program of use patterns and to develop and refine instruments. The second and third years were planned as the evaluation phase, followed by analysis and follow-up during the final years. Since this is a report of only the first year's activities, the evaluative data must be viewed as tentative and preliminary.

Rationale for the Evaluation Plan

During the past 20 years those most concerned with the study of occupational choice, career guidance, and the evaluation of vocational guidance procedures and programs have substituted the concept of career or vocational development for that of occupational choice, and the developmental criterion of vocational maturity for static criteria such as having an occupational choice or having a realistic occupational choice. The history of this change cannot be described in detail here, but some of the major issues, the major studies, and the important findings to date need to be identified to make clear the basis for the evaluation procedures selected for refinement in the first year of this project.

The developmental approach in vocational counseling seems to have had its origins in the 1930's and 1940's through both sociological and psychological studies in the USA and abroad (Davidson and Anderson, 1937; Buehler, 1933; Miller and Form, 1951; Ginzberg et al., 1951). The Career Pattern Study (Super, 1954, 1955; Super et al., 1957; Super and Overstreet, 1960; Super, Kowalski, and Gotkin, 1967) demonstrated that the conventional objectives and criteria of vocational guidance were invalid and irrelevant in

the 9th grade. While it is true that most 9th graders can and will, when asked to do so, report an "occupational choice", changes in educational and occupational plans are frequent during the high school years and consistency of choice or of field of choice is not related to other traits of known importance in 9th graders. Furthermore, even measures of realism or wisdom of occupational choice in the 9th grade are unrelated to occupational or career success or satisfaction at age 25. The findings of the Career Pattern Study have been confirmed by several independent investigations. The Career Development Study (Gribbons and Lohnes, 1968, 1969) essentially confirmed in 8th, 10th, and 12th grades the findings reported for the Career Pattern Study. In studying occupational plans and the outcomes of vocational guidance in several Wisconsin high schools, Rothney (1958) confirmed the instability and virtual irrelevance of early adolescent choices, as did Flanagan and others in Project Talent (Flanagan and Cooley, 1966; Cooley and Lohnes, 1968).

Appropriate objectives and criteria for 9th grades were shown, by the Career Pattern Study, to involve planfulness and time perspective (the tendency to look ahead and plan for anticipated situations), having and seeking needed information, and knowing what kinds of information are likely to be needed. These have been characterized as indices of vocational maturity, indices which show increases as adolescents go through high school and enter college and the world of work. A number of measures of vocational maturity have been developed, most during the past 10 years. It was Crites (1965) who first developed a practical measure, the Attitude Scale of the Vocational Development Inventory. He is currently working on a Competence Scale to complete the VDI, but, at this time, only the global score on the Attitude Scale is ready for use. The National Assessment Project has developed

items for assessing vocational maturity, but these are not now available to other researchers. Westbrook (Westbrook and Clary, 1967; Westbrook and Cunningham, 1970) also has developed an objective instrument, the Cognitive Vocational Maturity Test, which seeks to measure only the intellectual or informational, as contrasted with the affective or motivational aspects of vocational maturity.

Vocational maturity was measured in this project by the Career Development Inventory (CDI), developed specifically for the project by Super, Bohn, Forrest, Jordaan, Lindeman, and Thompson (1971). The objective was to create an independent, virtually self-administering inventory which would assess as many of the relevant vocational maturity factors as possible in one school period. Drawing upon the work of Super, Crites, Gribbons and Lohnes, and Westbrook, 11 dimensions of vocational maturity were initially identified. Items were written and scales developed to measure these dimensions. After pilot work involving factor analysis and item analysis, the scales were used in revised form during the 1970-71 academic year in the Genesee County study. Analysis of pretest results from 10th graders during Spring, 1971, led to the development of the scoring system upon which the results given in this report are based. The 11 dimensions initially identified were reduced to three, namely, Planning Orientation (Scale A), Resources for Exploration (Scale B), and Decision Making and Information (Scale C). Details of the development of these three vocational maturity scales of the CDI, as well as evidence of their validity and reliability are given in Forrest (1971). It suffices here to state that the three scale reliabilities (retest) range from .56 to .76, and that intercorrelations with the Crites, Gribbons and Lohnes, and Westbrook vocational maturity scales, and with intelligence, socioeconomic status, and school achievement, show that one CDI scale (C) is cognitive while two (A and

B) are affective, the last two being virtually independent of intelligence and socioeconomic status.

Objectives of the Study

Based on the findings of previous research outlined above, and keeping in mind the primary purpose of the first phase of the study, the objectives for the first year were formulated as follows:

1. Determination of the effects of the system on student vocational behaviors as evidenced through tests of vocational development, acquisition of occupational and decision-making knowledge, appropriate information-seeking activities, contacts with counselors, and evidence of planning activities.
2. Determination of the effects of the system on counselor attitudes toward vocational counseling, on changes in the quality of their contacts with student users, and on their attitudes toward the system as an aid in counseling.
3. Determination of the attitudes of student users and their parents toward the system and its reported effects on their educational and vocational planning.
4. Determination of optimum usage patterns for the second and third years of the field trial.
5. Refinement of the evaluation objectives, methods, instruments, and sampling procedures.

Subjects

The students participating in the field test and evaluation were 10th graders of the 25 public high schools of Genesee County, Michigan. To be considered eligible for inclusion in the study a student had to have on file

a grade-point-average from the previous year and complete scores on the Ohio Vocational Interest Survey (OVIS) and the Vocational Planning Inventory (VPI). Both instruments were used in producing a "search strategy" to help students use ECES. The 25 schools were paired on the basis of size, socioeconomic level, location, ethnic composition, number of counselors, and dropout rate. One member of each pair was randomly designated experimental, the other control. The experimental schools had 3,201 eligible sophomores, while the controls had 2,386.

The data gathered on these students included the following:

1. The Career Development Inventory, administered to both experimentals and controls in December, 1970, prior to exposure of the experimentals to the system, and again in May, 1971. Subscales comprising the three scales (A, B, and C) of the CDI are listed in Table 1.
2. Student Reaction Form. This questionnaire was administered immediately after use of the system to assess ECES users' immediate reactions to system format, ease of use, clarity of presentation, and to the general worth of the system.
3. Student Weekly Activities Report (SWAR). This brief checklist dealt with the activities of reading about, looking into, and discussing educational and occupational topics. It was administered weekly for 10 weeks to a sample of 250 experimentals and 250 controls who comprised the intensive study group.
4. Student Questionnaire. This form was administered in May, 1971, to a sample of ECES users to determine general reactions to the system and to assess its perceived effects on and contributions to the students' educational and vocational plans.

The 114 counselors in the 25 schools constitute the other major group of subjects in the evaluation. Data from counselors included the following:

1. Survey of Guidance Attitudes. This was a 27-item multiple-choice instrument administered to all counselors in December, 1970 and in May, 1971 to assess, before and after the experimental period, their belief in the value of the vocational counseling function in guidance.
2. Counselor Reaction Questionnaire. This instrument, given to all counselors in the experimental schools, was designed to assess the counselors' experience with ECES, the administration of the program, and interaction with student ECES users in counseling situations.

At the end of the experimental period a Parent Questionnaire was sent to the parents of a sample of experimental students to determine the effects of system usage on the interactions of parents with students in regard to educational and vocational planning activities. It also assessed parent attitudes toward the system.

Procedures

To obtain information on usage patterns when ECES is available on a voluntary basis to all sophomores, two terminals were placed in a large inner-city Flint school, and one in a suburban school. Students from the other 11 experimental schools were transported by bus to nine terminals located in a single room in the District headquarters building (GISD). The latter groups of experimental students received two two-period block sessions, one week apart. No optional sessions were available. With this arrangement only about 60% of the eligible students from these 11 schools could be accommodated on the terminals.

RESULTS

Use Patterns

Because optional use of the system at the GISD location was not possible, there was little opportunity to determine optimal usage patterns based on the present study. Combining all the students who used ECES, regardless of where and when they used it, produced the following distribution of hours of use.

No. of Hours Used	% of Users
6 or more	4
5	1
4	44
3	5
2	38
1	8

It is clear from this distribution that the modal number of hours of use was a function of the scheduling of experimental students at GISD. It is also clear that many of the students, for one reason or another, did not return to GISD for the second scheduled session. These data are much different from those obtained in the Montclair field trial (Thompson et al., 1970) where the mean number of hours of usage by 10th graders was 6.7. At Montclair, however, students could use the terminals as often as they wished.

Concerning the use of the two major parts of the system, the data show that during their first two-hour session approximately two-thirds of the users explored occupations while one-third explored majors. In the second session nearly all users explored occupations and two-thirds investigated majors. Apparently most students utilize both of these aspects of the system.

Student Reactions Immediately Following Use

Responses to the Student Reaction Forms were overwhelmingly favorable, as indicated in Table 2, where only the overall reactions to the system are

recorded. The great majority of students indicated highly favorable reactions to specific features of the system as well. The physical features of the system were seen as easy to use. The system was judged to explain ideas, occupations, and majors well. The charts were considered helpful, and the system was seen as being helpful with educational and occupational planning. After the second session more students wanted a longer period at the terminals, and more of them wanted to use it more often, suggesting that the value of the system became more apparent after greater familiarity was achieved. Although nearly all students gave favorable responses, the non-urban students were more enthusiastic than the urban students. Females were somewhat more enthusiastic than males, indicating they found it easier to use than did the males, and that they felt they received more help in educational and occupational planning.

Student and Parent Follow-up Reactions

Responses to the Student Questionnaire (SQ) and the Parent Questionnaire (PQ) were obtained late in the school year when all experimental students had completed their use of the system. These instruments were distributed to 340 students who had used the system for two sessions or more and to their parents. Although only about one-fourth of the students and parents returned usable questionnaires, responses of those who did was highly favorable. The students indicated that they felt more definite about plans after using ECES, that they could profit more from talks with counselors after using the system, and that the system was sufficiently personal, but was not making decisions for them. Most parents reported having discussed ECES with their children and estimated that because of ECES they had become more involved in their child's educational and vocational planning. In general, the parents' responses were

highly favorable and indicated a desire for their children's earlier introduction to the system.

Effects on Students: Vocational Maturity

Pretest and posttest data on the three scales of the CDI constitute the data on which the following results are based. Two types of analyses were done to compare experimental and control groups of 10th grade students: 1) those using sex and type of community as independent variables, and 2) those using race and sex as independent variables (restricted to schools in which both white and black students were represented).

No significant differences between subgroups of students were found on Scale A, Planning Orientation, in either type of analysis. Significant differences were found, however, on Scales B and C; the means of subgroups in the analyses of these scales are shown in Tables 3 through 5. We may summarize the results of these analyses of covariance as follows:

1. Treatment--Statistically significant differences between ECES users and non-users were found only among students from urban schools where there were a substantial number of black students enrolled. ECES users tended to show slightly greater improvement than non-users in terms of quality of potential and used occupational resources, as measured by the CDI. The difference, however, was small, being approximately one-fourth of a standard deviation. While it is true that this finding suggests a positive effect of the limited 1970-71 usage of ECES, it is not clear that the effect of two two-hour sessions at the terminals is of sufficient magnitude to enhance significantly the vocational maturity of students.
2. Sex--Statistically significant differences between males and females

were found only on CDI Scale C, Decision Making and Information. Females improved slightly more than males on this scale during the period of study, but the difference was so small that it is of little practical or theoretical significance.

3. Race--Statistically significant differences were also found between black and white students on CDI Scales B, Resources for Exploration, and C, Decision Making and Information. On Scale B, the difference was in favor of white students, and on Scale C in favor of blacks. Differences were small in both cases and of doubtful practical significance.

4. Location--Statistically significant differences were found on CDI Scale C, Decision Making and Information, between rural, suburban, and urban schools participating in the study. Rural schools tended to show slightly greater improvement during the study period, but, again, differences were small.

The results presented here show that with the pattern of use in the Genesee County schools in Spring, 1971, ECES had little practical effect on career development. Non-users increased in vocational maturity at approximately the same rate as ECES users. Whether positive ECES effects would be observed under different, perhaps expanded, usage patterns and whether longer-term effects will be observed as the study continues are not known at this time.

Effects on Students: Information-seeking Behavior

The Student Weekly Activities Report (SWAR) was administered to 10th graders in the three schools comprising the Intensive Study Group. It was administered by classroom teachers on a routine weekly basis from January

through May, 1971. Many of the forms showed careless markings which rendered interpretation of the data impossible. Such forms were not used in the analyses.

For purposes of analysis samples of approximately 100 control students and 60 experimental students were drawn. The SWAR yielded four scores based on whether the activities concerned educational or vocational pursuits and whether they took place in or out of school. No significant differences between experimentals and controls nor between males and females were found on any of the four scales. Furthermore, no significant changes were found in experimental students before and after using ECES, although some scores appeared to change in the expected direction, i.e., in the direction of a greater proportion of educationally and vocationally related activities.

Counselors' Attitudes toward Vocational Counseling

One of the objectives of the study was the assessment of counselors' attitudes toward the vocational guidance aspects of the counselor's role. The expectation was that such attitudes might be affected by the presence of ECES as an addition to the array of guidance media.

The Survey of Guidance Attitudes was mailed to all 114 counselors in the County at the beginning and again at the end of the school year. Eighty-one percent of the counselors returned completed SGA's at the beginning and 68% at the end. Responses indicated a widely-shared positive attitude toward vocational guidance activities on both pre- and posttest with no significant shift over time. Comparisons made among counselors from experimental vs. control schools, among those who reported different titles and job duties, and among those who reported spending differing amounts of time in counseling, revealed no dignificant differences on either pretest or posttest.

Counselors' Attitudes toward ECES

The Counselor Reaction Questionnaire (CRQ) was constructed on the basis of interviews with counselors in the experimental schools. In May, 1971, the CRQ was sent to all experimental counselors. Twenty-nine of the 40 experimental counselors returned usable forms.

Counselors' reactions to the effects of ECES on students were generally positive and supportive of the system. Exceptions were to the statements that ECES greatly reduced anxieties about occupational choice and that certain of the ECES messages proved discouraging to the student. Only about half of the counselors agreed with these statements, the other half disagreeing. Although students were seen as benefitting from ECES, the counselors were not uncritical of some of the specifics of the system.

Counselors' views of ECES hardware, scripts and mechanics were also generally positive, although opinion was divided on the ideal length of a student's interaction with the terminal and on the advisability of making ECES available to 9th graders. Concerning the effects of ECES on themselves, most of the counselors agreed that it had created more work for them, though this reaction is probably not due to the system itself, but to the experimental situation in which they were placed. A large number agreed that ECES had caused them to do some reading they would not otherwise have done, and many stated that they had been stimulated to do some independent local research on ECES users.

About half of the counselors responding felt that they were seeing types of students they had not previously seen. It was also significant that about half thought they were working with students at a "much higher level of problem solving" following ECES use.

SUMMARY

The first year of the field trial of ECES provided opportunities to explore various means of collecting data and suggested ways in which more useful data could be collected in the future. In general, it was learned that 10th grade students could use the system and enjoyed doing so. Though they tended to concentrate on occupations during their first sitting at the ECES terminal, they used their second sittings to explore both occupational and educational opportunities. Parents of users were generally pleased with the effects of the system and stated that they were more involved in the educational and vocational planning of their youngsters than they had been previously. Counselors had positive reactions to the system and were optimistic about its effects on students.

Despite the positive reactions of students, parents and counselors, the anticipated gains in vocational maturity was not realized. There was, however, some reason to suspect that more exposure to the system might have resulted in greater changes in planning orientation, the use of resources for exploration, and the quality of decision making and the amount of occupational information possessed.

The field trial continues. Improved instrumentation and data collection techniques should provide more definitive answers in the years that follow.

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Table 1. Subscales comprising the A, B, and C Scales of the Career Development Inventory.

Scale	Subscale	No. of Items
A: Planning Orientation	Specificity of planning	14
	Self-estimated amount of occupational information	11
	Definiteness of plans	1
	Concern with choice	7
	Total, Scale A:	33
B: Resources for Exploration	Quality of potential resources	15
	Quality of used resources	15
	Total, Scale B:	30
C: Decision Making and Information	Knowledge of decision-making principles	12
	Measured occupational information	18
	Total, Scale C:	30

Table 2. Students' overall reactions to ECES immediately following use.

Question: What is your overall reaction to the ECES system?

Response	After First Use	After Second Use
I like it very much.	328	53
I like it somewhat.	54	11
I dislike it somewhat.	4	0
I dislike it very much.	0	0
No response.	34	356

Table 3. Pretest and posttest means and adjusted posttest means and standard errors of experimental and control groups on CDI Scale C--by sex and type of community.

Type of Community	Treatment	Sex	N	Pretest Mean[a]	Posttest Mean[a]	Adjusted Posttest Mean[b,c]	St. Error
Urban	E	M	63	16.6	16.8	17.1	.43
		F	72	16.9	17.6	17.7	.40
	C	M	159	17.1	17.3	17.2	.27
		F	149	17.4	17.9	17.6	.28
Suburban	E	M	86	17.4	16.5	16.3	.37
		F	118	17.6	18.2	17.9	.31
	C	M	240	17.0	17.1	17.1	.22
		F	300	17.0	17.7	17.7	.20
Rural	E	M	39	16.7	17.5	17.8	.55
		F	33	16.0	17.5	18.2	.60
	C	M	76	16.7	17.8	18.1	.39
		F	77	17.0	18.3	18.3	.39

[a] Standard deviations for subgroups are not given. The average within-groups standard deviation was 4.7.

[b] Standard deviations for subgroups are not given. The average within-groups standard deviation was 3.4.

[c] Main effect of Sex: $F=8.57$, 1 and 1399 d.f. ($p < .01$)
Main effect of Type of Community: $F=5.28$, 2 and 1399 d.f. ($p < .025$)

Table 4. Pretest and posttest means and adjusted posttest means and standard errors of experimental and control groups on Vocational Maturity Scale B--by race and sex.

Treatment	Sex	Race	N	Pretest Mean[a]	Posttest Mean[a]	Adjusted Posttest Mean[b,c]	Posttest St. Error
E	M	B	54	241.3	245.6	243.0	4.87
		W	18	258.4	266.7	252.7	8.46
	F	B	52	262.1	260.3	243.8	5.03
		W	25	246.4	269.4	263.4	7.16
C	M	B	146	227.8	231.6	238.0	2.98
		W	30	232.6	248.7	251.9	6.53
	F	B	140	233.0	240.3	243.2	3.03
		W	35	239.8	237.2	235.6	6.05

[a] Standard deviations for subgroups are not given. The average within-groups standard deviation was 46.3.

[b] Standard deviations for subgroups are not given. The average within-groups standard deviation was 36.1.

[c] Main effect of Treatment: $F=4.23$, 1 and 491 d.f. ($p < .05$)
Main effect of Race: $F=4.75$, 1 and 491 d.f. ($p < .05$)

Table 5. Pretest and posttest means and adjusted posttest means and standard errors of experimental and control groups on CDI Scale C--by race and sex.

Treatment	Sex	Race	N	Pretest Mean[a]	Posttest Mean[a]	Adjusted Posttest Mean[b,c]	St. Error
E	M	B	49	17.3	17.8	17.7	.49
		W	14	14.4	13.2	15.2	.93
	F	B	53	17.7	18.4	18.0	.48
		W	19	14.9	15.4	17.0	.80
C	M	B	132	17.8	17.8	17.3	.30
		W	27	13.9	14.6	17.0	.68
	F	B	124	18.0	18.5	17.8	.31
		W	25	14.2	14.9	16.9	.70

[a] Standard deviations for subgroups are not given. The average within-groups standard deviation was 4.7.

[b] Standard deviations for subgroups are not given. The average within-groups standard deviation was 3.4.

[c] Main effect of Race: $F=6.66$, 1 and 434 d.f. ($p < .025$)